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回音壁腔光机械系统中的动力学行为

(吉首大学物理与机电工程学院, 湖南 吉首 416000)

Dynamical Behavior of Whispering-Gallery Cavity Optomechanical System

(College of Physics and Mechatronics Engineering, Jishou University, Jishou 416000, Hunan China)

- 摘要
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摘要 研究了在控制和探测激光存在时回音壁腔光机械系统中的动力学行为, 分析了系统中产生类似于原子电磁诱导透明与吸收的原因, 论证了此系统的输出场在探测频率下存在类似于电磁诱导透明和电磁诱导吸收的现象, 并证实了回音壁光机械腔系统与 Λ 原子系统中的泵浦探测响应特性相类似.此外, 利用泵浦失谐控制光机械系统中类似于电磁诱导透明和电磁诱导吸收之间的转换, 此系统中光机械诱导透明与吸收的论证为量子信息的处理提供了理论依据.

关键词: 回音壁光机械腔 光机械诱导透明 光机械诱导吸收 量子信息

Abstract: The dynamical behavior of whispering-gallery cavity optomechanical system under the action of a controlling laser and a probe laser is investigated. The origin of electromagnetically induced transparency (EIT) - like dips is analyzed. The existence of the analog of EIT and electromagnetically induced absorption (EIA) in the output field at the probe frequency in this optomechanical system is demonstrated. The pump-probe response for the whispering-gallery mode (WGM) shares the features of the Λ system in atoms. What's more, the switching between the EIT and EIA is dominated by the pump detune. The demonstration of EIT in this optomechanical system provides a theoretical basis for the quantum information processing.

Key words: whispering-gallery modes optomechanical cavity optomechanically induced transparency optomechanically induced absorption quantum information

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通讯作者: 邬云文 (1965-), 女, 湖南龙山人, 吉首大学物理与机电工程学院教授, 主要从事量子光学研究.

作者简介: 李小娟 (1986-), 女, 湖南衡阳人, 吉首大学物理与机电工程学院硕士生, 主要从事量子光学研究

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